REMARKS/ARGUMENTS

Claims 1, 4-13 and 20-34 and 38-67 remain in the application, of which claims 20-30 and 38-61 have been withdrawn from consideration. Reconsideration of the claims is respectfully requested.

The undersigned would like to thank Examiner Chambers for the courtesy of the telephone interview that was conducted in this matter on February 17, 2003. During that interview, the distinctions between the claims and the Darby, Adams and Jullian patents were discussed. Potential clarifying amendments to claims 1 and 64 were also discussed. No agreements were reached. A completed PTOL-413A is attached.

As is noted in the February 3, 2004 Office Action, the undersigned and the Examiner previously had a brief telephone conference on December 4, 2003. During that conversation, the undersigned indicated that he would fax the Examiner a Supplemental Response no later than December 5. The Examiner indicated that he would delay issuing another Office Action until he received the Supplemental Response. The undersigned faxed the Supplemental Response to the Patent Office on December 4, 2003. However, for some reason the Supplemental Response was not forwarded to the Examiner for several weeks. In the meantime, the Examiner issued a final Office Action on December 18, 2003. In early January, the undersigned contacted the Examiner because it appeared that the Examiner had not received the Supplemental Response of December 4 prior to issuing the December 18 Office Action. The undersigned also noted that the Examiner had not returned an initialed copy of the PTO Form 1449 for the IDS that had been filed on November 5, 2003. The Examiner

indicated he would pull the application file so he could review the Supplemental Response of December 4 and the reference cited in the November 5 IDS. The Examiner indicated that he would be issuing a new Office Action and that the undersigned should therefore disregard the December 18 Office Action. The Examiner thereafter issued an Advisory Action on February 3, 2004, which indicated that the date of response would be counted from the mailing date of the December 18, 2003 Office Action. Although the undersigned believes it is improper to measure the response date from the mailing of the December 18 Office Action, this response is being filed within the shortened two-month period for responding to the December 18 Office Action.

Turning now to the Office Action, at page 4, paragraph 13[1] of the Office Action rejects claims 33, 34, 66 and 67 under 35 U.S.C. 102(b) and (e) as anticipated by U.S. Patent No. 6,166,452 to Adams et al. and U.S. Patent No. 5,825,098 to Darby. This rejection is respectfully traversed.

As was discussed during the telephone interview of February 17, claims 33 and 34 require, *inter alia*, "means for transmitting a digital arming command onto the network." Claims 33 and 34 further require that "the logic device in each of the pyrotechnic devices is operative for storing activation energy in the associated pyrotechnic device if the digital arming command includes the unique identifier of the logic device." This claim feature provides added safety and reduced energy consumption by maintaining the pyrotechnic devices in an unarmed state until the

[1] It is noted that the paragraphs in the office action are misnumbered. For example, the paragraphs on page 6 are numbered as 15, 16, 17, 3, 4, 18. Therefore, this response cites to the page and paragraph number for clarity.

arming signal is issued. Applicant can discern no disclosure of these claim elements in Adams/Darby, nor has the Office Action identified where these claim elements can be found in these references. To the contrary, the Adams and Darby references appear to teach a system in which the energy storage capacitor 240 is continuously charged and available to activate the associated safety device 400. For example, in the embodiments SHOWN IN Figure 4 and 5 of Darby, the power converter 260 boosts the battery voltage and applies this increased voltage to the capacitor 240 to maintain the capacitor in a charged state. Similarly, Figure 6 of Darby shows an embodiment where the battery voltage is applied directly across the capacitor 240, thereby maintaining the capacitor 240 in a charged state. By contrast, the claimed invention only stores activation energy in a given pyrotechnic device in response to a digital arming command that includes the unique identifier associated with that particular pyrotechnic device. Hence, claims 33 and 34 are patentable over Adams/Darby.

Claims 33 and 34 further recite "means for altering an analog condition of the network to a firing condition . . . and releasing the stored activation energy into the initiator of its associated pyrotechnic device if both (1) the analog condition of the network has been modified to the firing condition and (2) the digital firing command includes the unique identifier of the logic device." Thus, in addition to arming a given pyrotechnic device, it is also necessary to both (1) modify an analog network condition and (2) issue a firing command that includes the unique identifier for the logic device of that specific pyrotechnic device. As is discussed in the specification, this claimed feature enhances safety by reducing the possibility of erroneously firing a pyrotechnic

device. (See, e.g., page 18, line 16 to page 19, line 11). This claimed combination is not disclosed nor suggested in the cited references.

According to the Office Action:

> The analog condition to firing condition subject matter of applicant's claim 33 is anticipated by the analog to digital converter disclosed in Darby. (See, Darby, col. 8, ll. 12-15; col. 14, ll. 3-40) and the DC-to-DC power converter 260. Controllers 200 comprise capacitors 240 that receive increased voltages from the converters 260. The devices are capable of detonating only when the proper voltage level is sensed 25 volts and a unique signal is received.

Applicant contends that this is not a proper interpretation of Darby. In particular, neither the cited text nor any other portion of Darby disclose or suggest "altering an analog condition of the network to a firing condition" and "releasing the stored activation energy into the initiator of its associated pyrotechnic device if both (1) the analog condition of the network has been modified to the firing condition and (2) the digital firing command includes the unique identifier of the logic device." The power converter 260 of Darby does not constitute a "means for altering an analog condition of the network to a firing condition" within the meaning of claim 1. Rather, the DC-to-DC power converter 260 of Darby is provided "for boosting the voltage level from a vehicle battery to a substantially greater voltage level than the voltage level of the vehicle battery, and for applying the substantially greater voltage level to an energy storage capacitor." (Darby, col. 8, lines 15-20, see also col. 13, lines 25-35). As was discussed during the telephone interview, the power converter 260 of Darby is always connected to the capacitor 240, so as to maintain the capacitor in a charged state. Hence, it cannot be said that the power converter modifies an analog condition of the network to a firing

condition, since the output of the power converter is continuously applied to the capacitor 240.

It is also not understood how the analog to digital converter of Darby has any relation to claims 33 and 34. There is simply no teaching that the analog to digital converter 252 of Darby functions to modify an analog network condition to a firing condition, as required by claims 33 and 34. Rather, Darby makes it clear that the analog-to-digital converter forms part of an SDC diagnostic circuit 250 which is operative for reading integrity data from various components on a respective safety device controller (SDC) 200:

> The SDC diagnostic circuit 250, which typically comprises a multiplexer and an analog-to-digital converter 252, comprises a means for reading the safety device controller integrity data, which includes integrity data for the SDC safing sensor 270, for the safety device 400, for the SDC energy storage capacitor 240, and for the SDC safety device activation circuit 230, and for reading functionality data of the SDC power converter 260. (Darby, col. 14, ll. 13-20).

As has previously been explained, Darby discloses only activating a given safety controller device (SDC) when integrity tests indicate that particular SDC has not malfunctioned.

> The safety device controller (SDC) 200 of FIG. 4 also comprises the SDC control circuit 210 which is a microprocessor in the preferred embodiment, for controlling the SDC communication interface 220, the SDC diagnostic circuit 250 and the SDC safety device controller 230. <u>The SDC control circuit 210 generates an SDC safety device activation signal 280 which is sent to the SDC safety device activation circuit 230 in response to a safety device activation command from the SDC communication interface 220 and safety device controller integrity data from an SDC diagnostic circuit 250 that does not indicate a malfunction.</u> (Darby, col. 14, ll. 3-13, emphasis added).

The SDC control circuit 210 then compares the data received from the SDC diagnostic circuit 250 with predetermined values to determine if the SDC 200 has malfunctioned.

> Also, when the SDC control circuit 210 receives an integrity data command from the SDC communication interface, it reads the safety device controller integrity data from the SDC diagnostic circuit 250, compares the safety device integrity data with predetermined limit values, and generates fault warning messages if the predetermined limit values are exceeded. (Darby, col. 14, ll. 21-27).

If no malfunctions are detected, the SDC control circuit 210 issues an activation signal 280 to the SDC safety activation circuit 230.

> The SDC control circuit 210 generates an SDC safety device activation signal 280 which is sent to the SDC safety device activation circuit 230 in response to . . . safety device controller integrity data from an SDC diagnostic circuit 250 that does not indicate a malfunction. (Darby, col. 14, ll. 7-13)

Upon receipt of the activation signal 280, the SDC safety device activation circuit 230 couples the capacitor 240 to the safety device 400, provided an SDC safing sensor 270 (in the form of an electromechanical acceleration sensor) is also closed. (Darby, col. 14, lines 30-40).

Hence, as has previously been noted, Darby discloses activating a particular SDC 200 when the following three conditions are met: (1) an activation command has been issued to that particular SDC, (2) an integrity test of that particular SDC produces acceptable results, and (3) an electromechanical acceleration sensor (safing sensor 270) has been closed.[2] Darby does not, however, disclose or suggest "altering an analog condition of the network to a firing condition" and "releasing the stored activation

[2] Note that this third condition is not required in certain embodiments, see, e.g., Figures 5 and 6.

energy into the initiator of its associated pyrotechnic device if both (1) the analog condition of the network has been modified to the firing condition and (2) the digital firing command includes the unique identifier of the logic device," as required by claims 33 and 34. Hence, claims 33 and 34 are patentable over Adams/Darby.

Claims 66 and 67 are similarly patentable over Adams/Darby. In particular, claims 66 and 67 recite "a bus controller connected to said plurality of pyrotechnic devices through said network, said bus controller being operative to (1) transmit a digital arming command onto the network, the digital arming command using one or more of the unique identifiers (2) alter an analog condition of the network to a firing condition; and (3)transmit a digital firing command onto the network, the digital firing command using one or more of the unique identifiers." The Office Action equates the ECU of Adams/Darby to a bus controller. However, applicant can discern no disclosure in Darby/Adams that the ECU performs the operations required by these claims, nor has the Office Action identified where these claim elements can be found in these references. As was noted above, Darby/Adams does not disclose or suggest issuing both an arming command and a firing command. Rather, at most these references disclose issuing an activation command to and SDC which is always maintained in a charged state. According to the Office Action, "the analog condition to firing condition subject matter of applicant's claim 33 is anticipated by the analog-to-digital converter disclosed in Darby. (See, Darby, col. 8, ll. 12-15; col. 14, ll. 3-40) and the DC-to-DC power converter 260." As was noted above, applicant disputes this interpretation of Darby. Moreover, as is clearly shown in Darby, e.g., at Figure 4, the DC-to-DC power

converter 260 and the analog-to-digital converter 252 are both contained within the SDC 200; they are not part of the ECU, which the Office Action has equated to a bus controller. Hence, the power converter 260 and analog-to-digital converter cannot meet the bus controller element recited in claims 66 and 67. In view of the above, claims 66 and 67 are patentable over Adams and Darby.

At page 5, paragraph 14, the Office Action rejects claims 1, 4, 5, 7, 8-12 and 31-32 as being obvious over Adams/Darby in view of U.S. Patent No. 5,014622 to Jullian. This rejection is respectfully traversed. As was discussed during the telephone interview, and as has been explained in prior amendments, in a system according to claim 1 a single command can be used to address as few as one and as many as all of the devices (or any combination therebetween). Claim 1 has been amended to clarify this distinction and now states that "a single command can be used to address as few as one, as many as all, and any combination of the pyrotechnic devices that are connected to the network," a feature which is not disclosed or suggested in the cited references. In particular, Darby and Adams both utilize specific, unique address codes for each device. Neither of these reference disclose or suggest addressing more than one device with a single command. Hence, as an initial point, Applicant contends that it would not be obvious to combine Jullian with Adams/Darby in the manner suggested. Rather, this combination appears to be the result of improper hindsight reconstruction based on Applicant's disclosure. In any event, even if the proposed combination were made, the system of claim 1 is still patentable thereover because the resulting combination would not provide the ability to "address as few as one, as many as all, and

any combination of the pyrotechnic devices" using a single command, as required by claim 1. In this regard, Jullian discloses two addressing formats, namely a specific addressing format and a universal addressing format. (See Jullian, col. 7, lines 1-27). The specific addressing format of Jullian is used to send commands to a particular blasting cap and is similar to the addressing format that is used by Darby/Adams. The universal addressing format of Jullian is an address that is common to all of the blasting caps and, hence, can be used to send the same command to all of the blasting caps. Jullian does not, however, disclose an addressing format whereby a single command can be used to address any combination of the devices, e.g., more than one but less than all of the devices. The system of claim 1 provides complete flexibility in testing, loading, disarming and/or firing any subcombinations of the pyrotechnic devices that are connected to the network. This feature simply is not disclosed or contemplated in Darby, Adams or Jullian. Hence, claim 1 (and its dependent claims 4-13, 31 and 32) are patentable over the cited references.

Claims 4-13, 31 and 32 depend from claim 1 and are patentable for the reasons given in connection with claim 1. Moreover, these claims define further patentable features over the art. For example, claim 4 further recites that the "bus controller transmits and receives multiplexed digital signals over said network." The Office Action equates the electronic control unit (ECU) of Adams to the claimed bus controller. The Office Action cites to column 5, lines 29-32 of Adams in connection with the multiplexing feature recited in claim 4. This portion of Adams states that "[t]he diagnostic means comprises, for example, a multiplexer an analog-to-digital converter for reading the

safety device controller integrity data and sending the controller integrity data to the ECU (Emphasis Added)." This does not constitute a disclosure of a bus controller that transmits and receives multiplexed digital signals over a network, as recited in claim 4. At most, the ECU of Adams may receive multiplexed signals. Hence, this is an additional patentable distinction between claim 4 and Adams.

Claims 31 and 32 ultimately depend from claim 1 and are patentable over the proposed combination of Adams/Darby and Jullian for the reasons given above. Moreover, these claims recite further patentable distinctions over the proposed combination of references. Specifically, claim 31 specifies that the "bus controller "automatically assigns the unique identifiers to each logic device." Claim 32 further specifies that "the bus controller assigns the unique identifies to the logic devices each time the ordnance system is powered up." As has previously been acknowledged by the Examiner, neither Darby nor Adams disclose the subject matter of these claims. Instead, the Office Action relies on Jullian for allegedly providing the missing teaching. According to the Office Action (see page 6, paragraph 15), "Jullian discloses a blasting system comprising a blaster and blasting caps, the blaster operable to assign the blasting caps a unique identifying address (Jullian col. 15, ll. 10-20 and col. 16, ll. 28-38)." However, Jullian does not disclose or suggest a networked ordnance system where a bus controller automatically assigns unique identifiers, as required by claims 31 and 32. Rather, Jullian discloses a system in which a person (referred to as the "blaster") manually assigns address codes, which are preferably unique, to blasting

caps using a blasting galvanometer 18. The specification makes it clear that the term "blaster" is used in Jullian to refer to a human being, not part of the blasting system.

> Overall system operation will now be described with reference to the manner in which a blaster might potentially operate the blasting system. The blaster first examines the blast site and determines where the blasting caps should be installed, preparing a map showing the expected location of each blasting cap and the delay which is required for each blasting cap. Such matters are within the general knowledge of an expert blaster and will not be described in greater detail. (Jullian, col. 14, ll. 24-33).

Moreover, although Jullian does allow programming the blasting caps with unique codes, this operation requires human intervention (by the blaster), as opposed to being automatically performed by the bus controller, as recited in the rejected claims. Specifically, Jullian discloses a system which allows the blaster, i.e., a person, to manually assign address codes for the blasting caps using the blasting galvanometer 18:

> The blaster can then set a new address for the blasting cap. The object at this stage of operations is to assign an address which will uniquely identify the blasting cap in the blasting circuit. The blasting caps are preferably assigned consecutive addresses as this reduces the time required by the blasting galvanometer 18 at later stages of operation to check whether the blasting caps are operatively coupled to the required blasting circuit. This also simplifies scanning of the blasting circuit for improperly connected blasting caps and expedites the operations of the blasting machine 20, as described more fully below.
>
> To initiate the setting of the blasting cap's address, the blaster depresses the set address key 38. The blasting galvanometer 18 then transmits a READ ADDRESS command to the blasting cap using the universal blasting cap address, awaits a response packet containing the current address and nominal delay of the blasting cap, and stores the returned information in its RAM 56. The blasting galvanometer 18 then displays the CAP OK message indicating that the blasting cap is functioning. (The blasting galvanometer 18 otherwise indicates a blasting cap malfunction.) The message is acknowledged by depressing the enter key 50, and the

> blasting galvanometer 18 then displays the message ADDRESS SET followed by the current address recorded in the blasting cap. The blaster acknowledges the message, and the blasting galvanometer 18 prompts the blaster to enter a new address with the message NEW ADDRESS. The blaster then composes and enters the new address which is loaded into a particular RAM location for temporary storage and which is initially set to a zero value. Alternatively, the blaster can simply depress the increment key 44 which increments the value stored in the memory location and initially set to zero by 1. The blasting galvanometer 18 then transmits a WRITE ADDRESS command containing the new address to the blasting cap. This causes the blasting cap to write the new address into the EEPROM for use in further communications and a response packet is returned which essentially confirms receipt of the WRITE ADDRESS command. The blasting galvanometer 18 then transmits a READ ADDRESS command (using the universal blasting cap address) to the blasting cap to cause return of a data packet containing the address of the blasting cap as currently recorded in its EEPROM. The blasting galvanometer 18 compares the address information returned with the address originally transmitted, and generates the message CAP OK if the address has been properly recorded by the blasting cap and otherwise displays the message CAP ERROR indicating a failure to properly record the newly assigned address.

Jullian simply does not disclose a bus controller, nor does it disclose a bus controller that automatically assigns unique identifiers, in the manner recited in claims 31 and 32. Hence, even if Jullian were combined with Adams/Darby in the manner suggested in the Office Action, the resulting system would fail to anticipated claims 31 and 32. In particular, the resulting combination would require human intervention, e.g., by the blaster, to assign the unique identifiers. The combination would not provide a system where "the bus controller automatically assigns the unique identifiers," as recited in claim 31. The resulting combination also would not provide a system in which "the bus controller assigns the unique identifies to the logic devices each time the ordnance system is powered up," as recited in claim 32. Having the bus controller automatically assign the unique identifiers provides the advantage of making the system more flexible

in that components can readily be added or removed to the system. Hence, claims 31 and 32 are patentable over Adams/Darby in view of Jullian.

At page 6, paragraph 18, claims 6 and 9 are rejected under 35 USC §103(a) as being unpatentable over Adams/Darby in view of Jullian and in further view of U.S. Patent No. 5,206,455 to Williams. Claims 6 and 9 depend from claim 1 and are patentable over Adams/Darby in view of Jullian for the reasons given above. Williams fails to cure the deficiencies of the Adams/Darby and Jullian combination. Therefore, claims 6 and 9 are patentable over the combination proposed in the Office Action.

At page 7, paragraph 19 the Office Action rejects claim 13 under 35 U.S.C. 103(a) as being unpatentable over Adams in view of U.S. Patent No. 6,403887 to Kebabjian. Claim 13 depends from claim 1 and is patentable over Adams for the reasons discussed above. Kebabjian fails to address the deficiencies of Adams as it relates to claim 1. In particular, Kebabjian fails to disclose or suggest a networked electronic ordnance system where "a single command can be used to address as few as one, as many as all, and any combination of the pyrotechnic devices that are connected to the network." Hence, claim 13 is patentable over Adams and Kebabjian.

At page 7, paragraph 6, claims 62 and 63 are rejected under 35 USC 103(a) as being unpatentable over Adams/Darby in view of Jullian. Claim 62 specifies that the bus controller "automatically assigns the unique identifiers to each logic device." Claim 63 depends from claim 62 and further specifies that "the bus controller assigns the unique identifies to the logic devices each time the ordnance system is powered up."

Hence, claims 62 and 63 are patentable over Adams/Darby in view of Jullian for the reasons given above in connection with claims 31 and 32.

At page 8, paragraph 7 of the Office Action rejects claims 64 and 65 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,341,562 issued to Brisighella in view of Adams and further in view of Jullian. As was discussed above, Adams and Jullian fail to disclose or suggest an addressing scheme where "a single command can be used to address as few as one, as many as all, and any combination of the pyrotechnic devices that are connected to the network." Brisighella fails to overcome the deficiencies of Adams and Jullian. Hence, claims 64 and 65 are patentable over the proposed combination of Adams, Jullian and Brisighella.

In view of the above, claims 1, 4-13, 31-34 and 62-67 are believed to be in condition for allowance. The Examiner is invited to telephone Applicant's undersigned attorney at (312) 775-8000 if any unresolved matters remain.

Fee Payment and Authorization

Please charge any fees due in connection with this submission to Deposit Account No. 13-0017.

Respectfully submitted,

Date: February 18, 2004

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